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September 30, 2010

EX PARTE NOTICE

Electronic Filing

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW, Room TW-A325
Washington, D.C. 20554

Re: *700 MHz Interoperable Broadband Public Safety Network*
WT Docket No. 06-150, PS Docket No. 06-229,
GN Docket Nos. 09-47, 09-51, 09-137, RM Docket No. 11592

Dear Ms. Dortch:

On September 29, 2010, Prof. Dennis Roberson and Dr. Ken Zduenk of Roberson and Associates, LLC and the undersigned of T-Mobile met with Angela Giancarlo, Chief of Staff and Senior Legal Advisor, Wireless & International, Commissioner McDowell's Office. During the meeting Prof. Roberson and Dr. Zduenk presented the attached overview of their recently filed Whitepaper in these proceedings.

Pursuant to Section 1.1206(b) of the Commission's rules, an electronic copy of this letter is being filed with the office of the Secretary.

Respectfully submitted,

/s/ Thomas Sugrue
Vice President,
Government Affairs
T-Mobile USA, Inc.
401 9th Street, NW
Suite 550
Washington, DC 20004

/s/ Kathleen O'Brien Ham
Kathleen O'Brien Ham
Vice President,
Federal Regulatory Affairs
T-Mobile USA, Inc.

Technical Analysis of the Proposed D-Block Action

Prepared for T-Mobile, USA

by Roberson and Associates, LLC

Motivation for Technical Analysis

- T-Mobile sought assistance in assessing technical issues around D-Block allocation
- Roberson and Associates, LLC performed a preliminary analysis
  - Determined that a more technically inclusive perspective than done previously was warranted
  - A broader technical perspective would allow better and more informed decision making

Overall Benefit of D-Block Auction

- 700 MHz Provides Unique Opportunity to Satisfy Public Safety Needs and Provide Commercial Benefit
  - Both Public Safety and adjacent D-Block will use LTE technology, allowing Public Safety additional capacity in emergencies
  - LTE economies of scale will make leading-edge capabilities available to Public Safety at lower cost

Summary of Findings

- Public Safety Video Capacity
  - FCC Analysis is sound: Only recent, realistic, systematic assessment
  - Multiple Video Streams provided by 10 MHz
  - 50 MHz of 4.9 GHz Spectrum provides local area video for compact incident scenes: complements 700 MHz wide-area
  - For future integrated Voice-Video network, repurposing narrowband voice spectrum should be considered

- Use of D-Block by Public Safety Via LTE
  - 15 LTE access classes and 9 bit rate levels give sufficient priority for public safety
  - LTE can prevent low-priority users from clogging the access channel in emergencies
  - LTE provides for entering high-priority streams to slow down lower priority users
- Interference
  - D-Block effect on Public Safety Broadband
    - Previous analysis was worst case, not realistic
  - D-Block effect on GPS receivers
    - Can be addressed in device design

Conclusions

- There are no technical impediments to
  - Auctioning D-Block to Commercial Use
  - Using D-Block Networks for Public Safety during major disasters
- There is sufficient dedicated wide-area public safety broadband capacity in 10 MHz at 700 MHz to meet day-to-day video needs

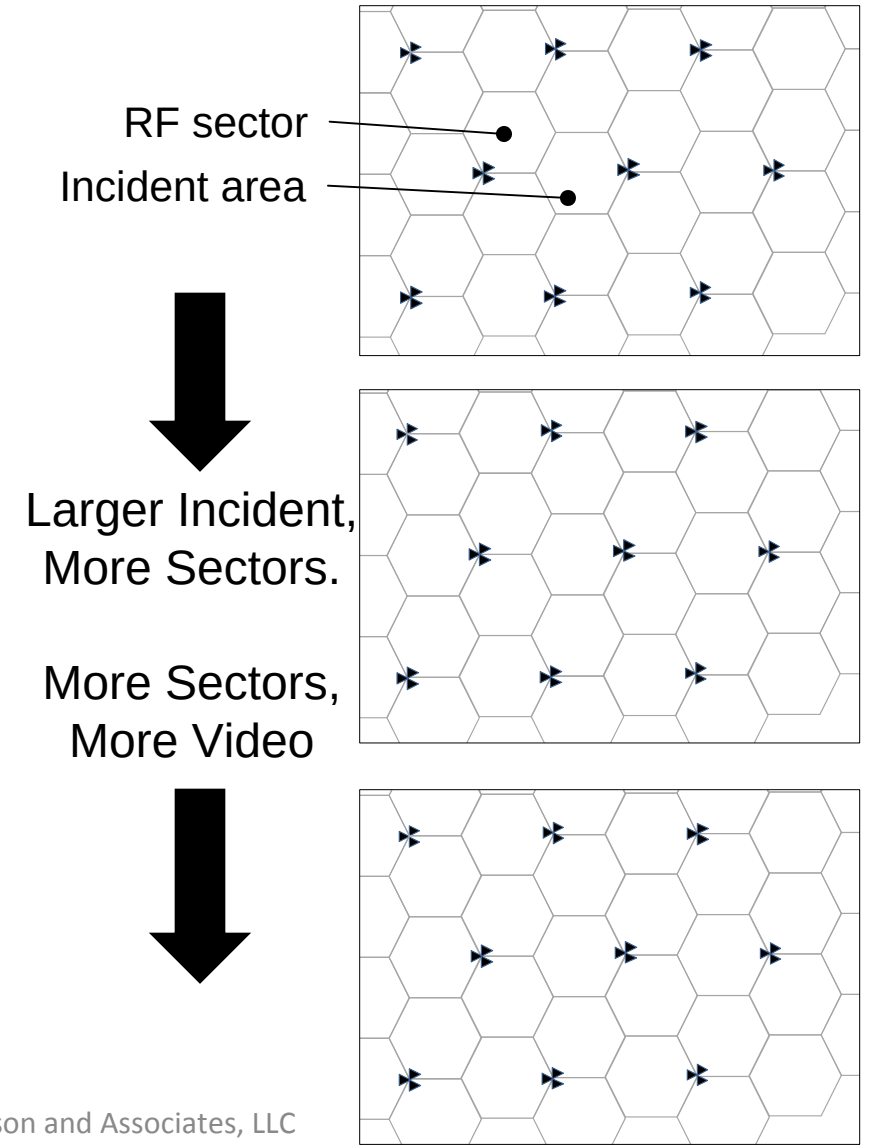
Video Capacity

Reality:

- The number of RF Sectors serving an incident increases as the geographic area of the incident increases

- The video capacity available for an incident increases as the incident area increases

- Smaller incident areas are suitable for 4.9 GHz local networks
- Multi-band wireless routers already exist



High Quality Video Streams Provided by 10 MHz Public Safety Broadband Network

Calculation:

$$N_{video\ streams} = \frac{\text{Link Capacity}}{\text{Video Rate}} x \text{ Number of Sectors for Incident}$$

$$\text{Number of Sectors for Incident} = \frac{Area\ of\ Incident}{Area\ of\ Sector}$$

Assumptions:

- 1.2 Mbps Video Rate (high quality)
- 7.5 Mbps avg. LTE Down-Link Capacity
- 3.5 Mbps avg. LTE Up-Link Capacity
- 3 RF sectors per cell
- Sector Area = cell area / 3

High Quality Video Streams Provided by 10 MHz Public Safety Broadband Network

- The number of video streams available for an incident increases as the area of the incident increases
  - More RF sectors serve the incident

		Potential Number of RF Sectors Serving an Incident				Potential Number of 1.2 Mbps Downlink Streams				Potential Number of 1.2 Mbps Uplink Streams			
		Incident Area (sq. miles)				Incident Area (sq. miles)				Incident Area (sq. miles)			
Cell Size (radius, meters)	RF Sector Area (sq. miles)	0.5	1	2	4	0.5	1	2	4	0.5	1	2	4
500	0.10	4	9	19	39	25	56	118	243	11	26	55	113
750	0.23	2	4	8	17	12	25	50	106	5	11	23	49
1000	0.41	1	2	4	9	6	12	25	56	2	5	11	26
1500	0.92	1	1	2	4	6	6	12	25	2	2	5	11

Reality: Significant number of video streams are available with 10 MHz spectrum.

Public Safety Voice Capacity Assessment

Epoch 2,3: Effect of Narrowbanding:

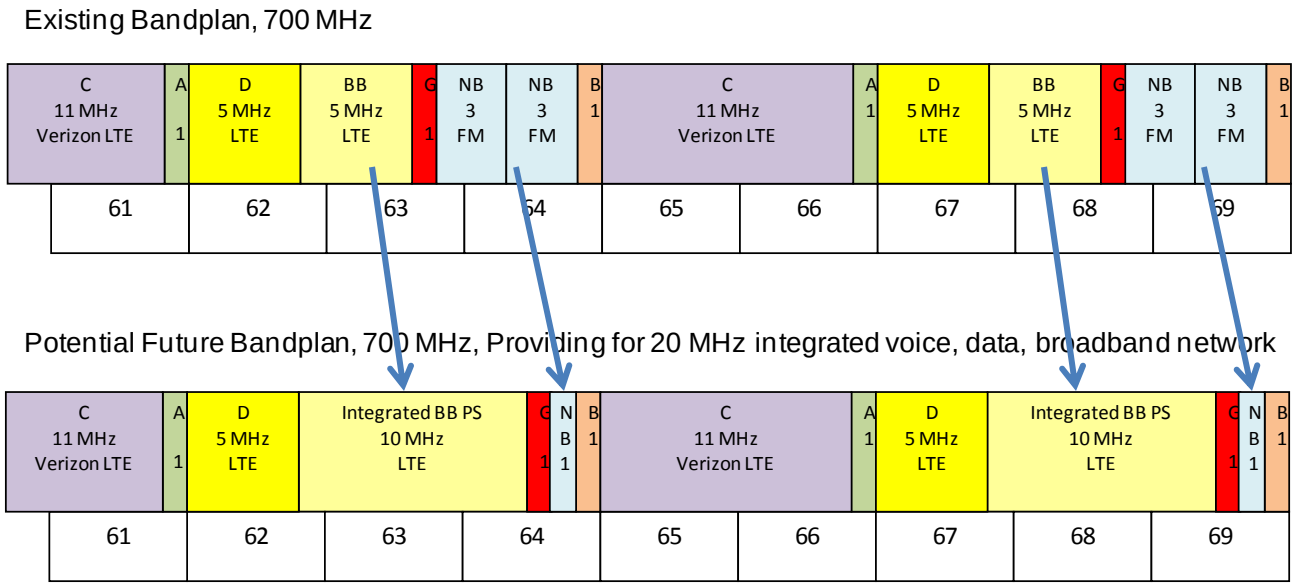
$$\text{Number of Voice Channels} = \frac{\text{RF Bandwidth}/2}{6.25\ kHz/voice\ channel}$$

	Epoch 1 Current Narrowband Spectrum (25kHz voice bandwidth)			Epoch 2 Available Narrowband Spectrum (6.25 kHz voice bandwidth below 800 MHz) (without 700 MHz spectrum)			Epoch 3 Available Narrowband Spectrum (6.25 kHz voice bandwidth below 800 MHz) (with 700 MHz spectrum)		
	Current Spectrum (MHz)	Current Voice Channels /Area	Approx Users/ Service Area	Available Spectrum (MHz)	Available Voice Channels/Area	Approx Users/ Service Area	Available Spectrum (MHz)	Available Voice Channels/Area	Approx Users/ Service Area
Narrowband Spectrum									
25-50	6.3			6.3			6.3		
138-144/148-174	3.6			3.6			3.6		
220-222	0.1			0.1			0.1		
450-470	3.7	74	5,180	3.7	296	20,720	3.7	296	20,720
806-821/851-866	3.5	70	4,900	3.5	70	4,900	3.5	70	4,900
821-824/866-869	6.0	120	8,400	6.0	120	8,400	6.0	120	8,400
806-824/851-869 (reconfiguration)				4.5	90	6,300	4.5	90	6,300
Total Narrowband w/o 700 MHz	23.2	264	**18,480**	27.7	**576**	**40,320**	**27.7**	**576**	**40,320**
700 MHz Narrowband							**12**	**960**	**67,200**
				Total Narrowband w. 700 MHz			**39.7**	**1536**	**107,520**

700 MHz alone provides *1.75x* current Voice chls.

700 MHz provides *2.75x* current voice chls.

Future: Repurposing Narrowband Voice Spectrum to provide Integrated Voice-Data Network

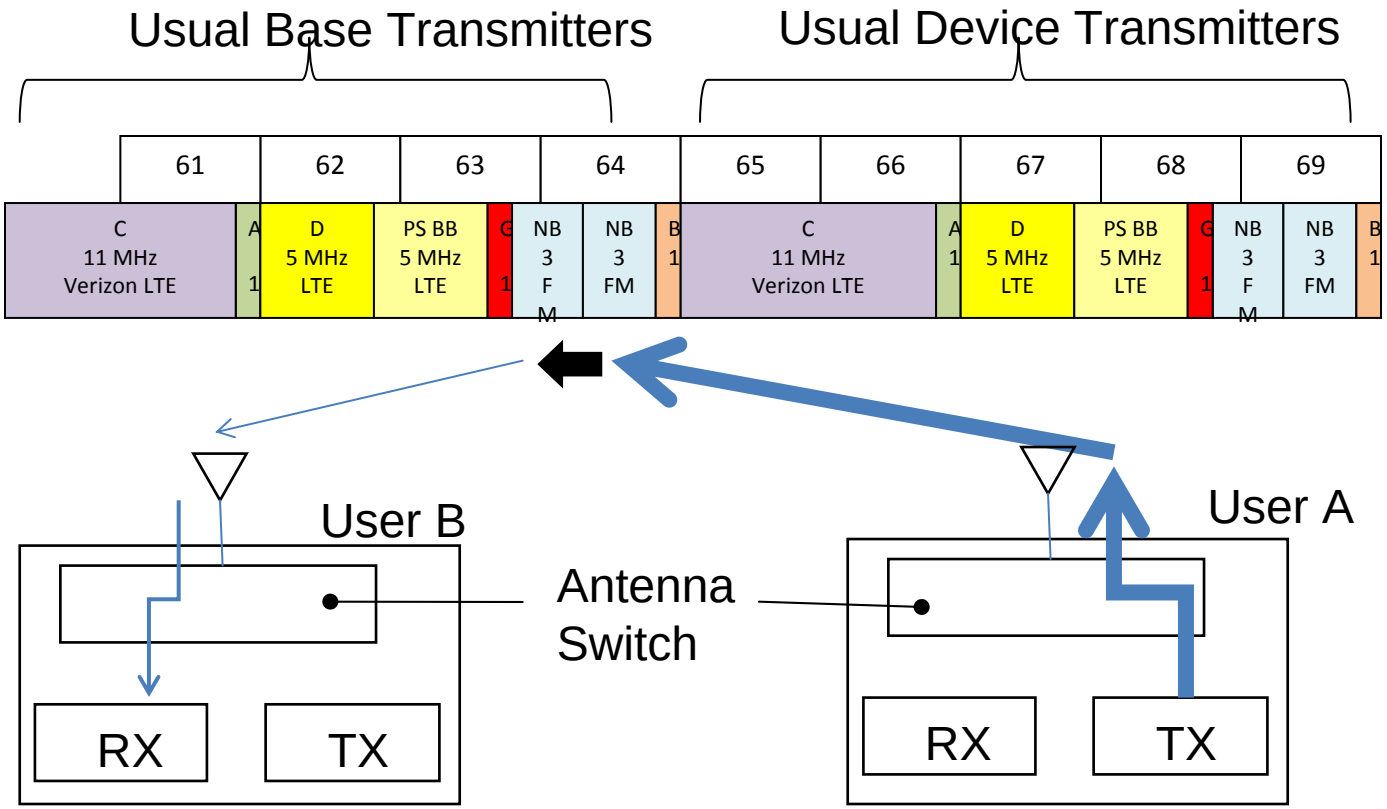


Future: 2 MHz of Narrowband Voice still provides <u>160</u> narrowband communication channels.

20 MHz Public Safety network can accommodate <u>BOTH</u> voice and video.

Talk-Around: Non-Network Operation

- Essential public safety *voice* capability



Reality

- Devices can be designed for both LTE, and off-network modes. (similar devices are commercially available today)

Operation

- User Device "A" Transmits Directly to User Device "B" on Frequency Normally Used by the Base Station
- Device Cannot Transmit and Receive Simultaneously

Future: Effect of Repurposing Narrowband Spectrum

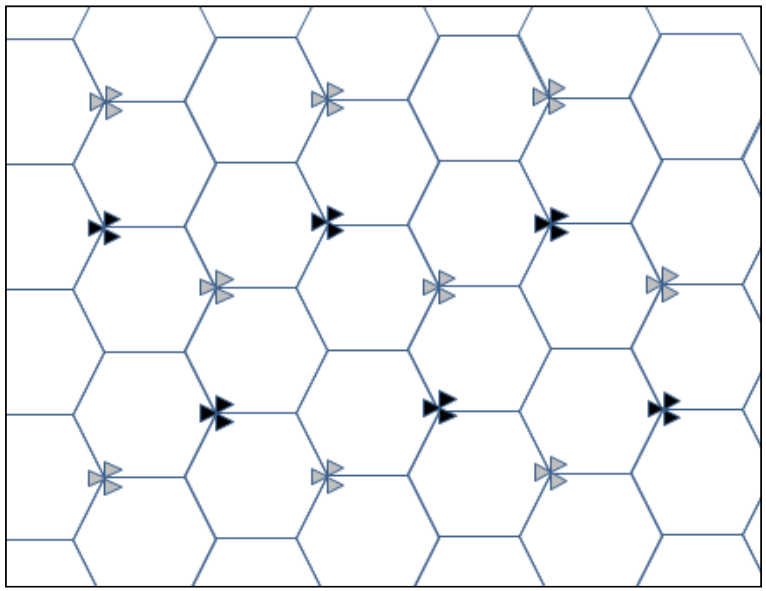
	Potential Long-Term Future Available Narrowband Spectrum (6.25kHz voice bandwidth below 800 MHz) (with 700 MHz spectrum)		
	Available Spectrum	Available Voice Channel Equivalent	Approx Users/ Service Area
Narrowband Spectrum			
25-50	6.3		
138-144/148-174	3.6		
220-222	0.1		
450-470	3.7	296	20,720
806-821/851-866	3.5	70	4,900
821-824/866-869	6	120	8,400
806-824/851-869 (reconfiguration)	4.5	90	6,300
Total Narrowband w/o 700 MHz	27.7	**576**	**40,320**
700 MHz Narrowband	**2**	**160**	**11,200**
Total Narrowband w. Alt. 700 MHz	**29.7**	**736**	**51,520**

160 narrowband voice channels remain at 700 MHz

736 total narrowband voice channels

Previous Interference Analysis - D-Block Effect on Public Safety

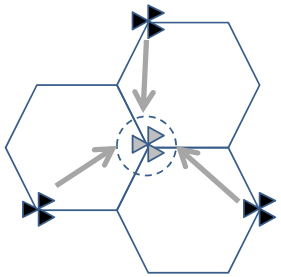
Cell – Site Configuration for Analysis of D-Block to PSST Interference



= D-Block Sites

= Public Safety Sites

Configuration is Worst-Case Situation for Interference



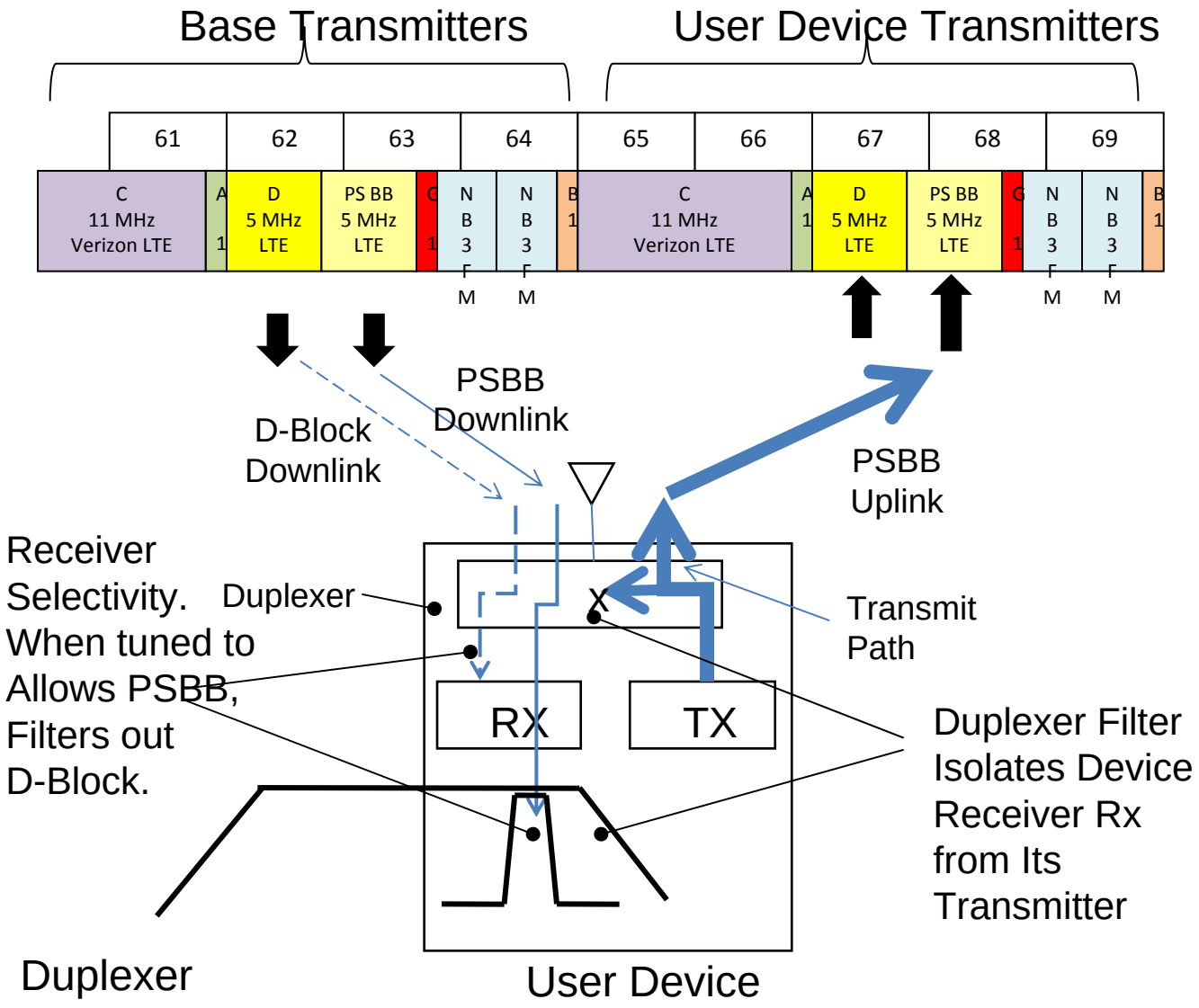
D-Block Sites are systematically placed where signals from Public Safety Sites are weakest and most vulnerable to interference (D-Block Sites are at edge of Public Safety Site coverage)

Worst-case analysis is unrealistic

Figure: Analysis of Cell Site Configuration Used in Previous Interference Analysis

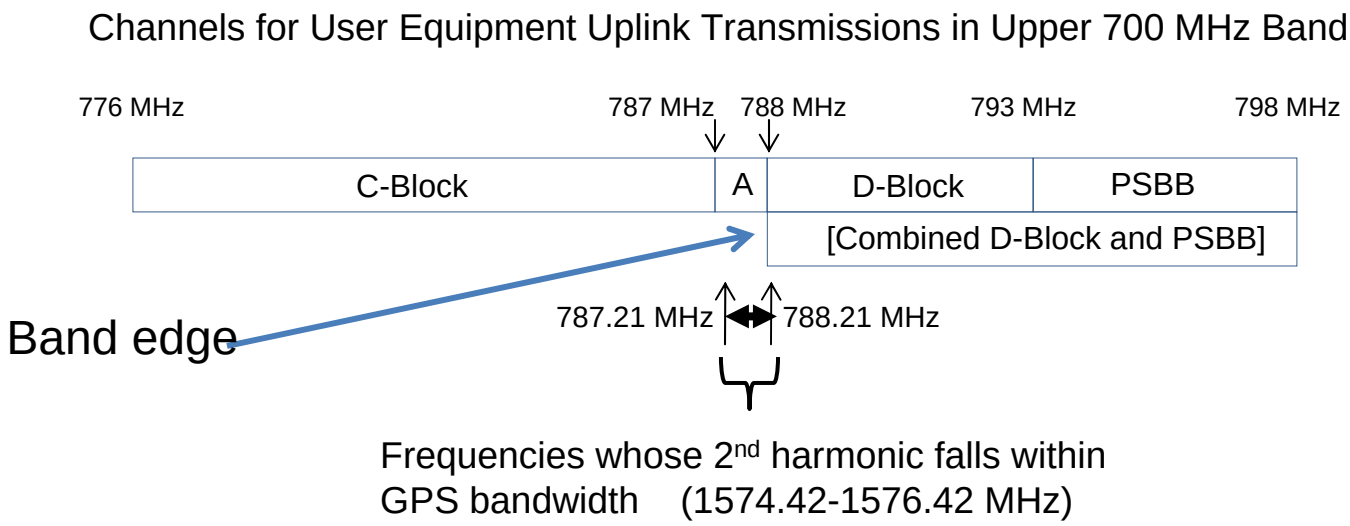
- Reality: LTE air interface has been designed for adjacent networks in adjacent bands
  - D-Block and Public Safety network use similar cell sizes, or co-located sites
- 800 MHz experience is irrelevant: Completely different system configurations there.

Function of Duplexer Filter



- Reality: The Duplexer is not the main adjacent band interference element

GPS Interference Relationships at 700 MHz



Reality

- From an interference standpoint, there is little difference between a separate D-Block, and a combined D- and Public Safety Block
  - Both band edges are in the same place
- Any issues can be addressed during device design

Myth and Reality

Capacity

Issue(Myth)	Solution(Reality)
• Insufficient throughput at cell edge	➢ Gain antennas & mobile pico-cells
• Insufficient capacity for compact incident scene in single sector.	➢ Existing bandwidth, mobile pico-cells, and 4.9 GHz provide ample capacity
• 4.9 GHz not usable for emergency incidents	➢ 4.9 GHz suited to compact incidents and backhaul; complements 700 MHz.
• Multi-band wireless routers are infeasible	➢ Multi-band wireless routers exist today
• FCC Whitepaper Analysis is Naïve	➢ Whitepaper is best recent systematic & objective analysis of specific public safety scenarios
• Cannot provide talk-around voice	➢ Network/ Non-Network devices exist today
• Additional Spectrum Needed for Public Safety Video	➢ Additional spectrum only desirable if voice is added to network.

LTE

Issue(Myth)	Solution(Reality)
• Insufficient priorities on LTE	➢ 15 Access classes and 9 bit rate levels
• Public Safety Users will be blocked during emergencies	➢ LTE packet mode inhibits low priority users, allows high-priority streams on –the-fly
• No standards/policies for public safety priority on LTE exist	➢ 3GPP work item well underway; NGN GETS activity is addressing.
• No mechanism to switch public safety users to commercial network.	➢ Automatic reconfiguration of devices and “storm plans” are well known.

Interference

Issue(Myth)	Solution(Reality)
• D-Block will interfere with Public Safety	➢ LTE Designed for adjacent-band systems
• D-Block devices will interfere with their own GPS receivers.	➢ No difference if bands are combined.. Any issues can be addressed during design.